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Fairness in the Labour Market – A Survey of Experimental Results

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Abstract

In this chapter we provide a selective survey of experiments to investigate the potential of social motivations in explaining labour market phenomena. We argue that laboratory experiments are a useful instrument to explore issues in labour market theory and personnel economics. Our starting point is the observation that employment relations are frequently governed by incomplete contracts. We show that the norm of reciprocity that leads to gift exchanges is an effective contract enforcement device under conditions of contractual incompleteness. We then present evidence that gift exchange can explain various labour market phenomena that are puzzles from the viewpoint of standard economic theory. Further issues in the related field of personnel economics that have by now been subjected to an experimental scrutiny concern characteristics of the employment relation and the issues of motivation and incentives systems. We conclude by pointing out the complementary nature of experiments to more conventional methods of data gathering.

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1. The comparative advantage of experiments in labour market research

Is the labour market best described as any other neo-classical market, like the market for groceries, or is the labour market substantially different? Much of research in labour economics has such a question in its background. As an example, take the issue of *non*-compensating wage differentials. There is a huge empirical literature on the question of whether observed wage differentials reflect merely a compensation for working conditions, skills, etc., or whether they contain elements of true rents. Clearly, the existence of true rents, i.e., non-compensating differentials, is in sharp conflict with the neo-classical view of the labour market. As a second example, take the question of whether real and/or nominal wages are rigid, which is also a central topic in macroeconomics. Sticky wages are held responsible for involuntary unemployment, real effects of monetary policy, and business cycle fluctuations. The important question therefore is: Are wages rigid because of some outside intervention – a possibility that is fully compatible with a neo-classical view of the labour market – or are there *endogenous* reasons for wage rigidities?

A further topic that is in particular studied in the related field of personnel economics (see Lazear 1995, 1998, 1999) concerns the characteristics of employment relationships and the issue of the proper motivation of employees. What are the economic consequences of the fact that most employment relations are contractually incomplete, long-term and take place mostly in non-anonymous environments? How can employees be induced to provide a satisfactory work effort? How do various incentive schemes work that were devised to overcome the motivation problem?

This paper surveys the results of many experiments that were designed to answer these questions. There are, however, various ways how one can test the issues raised in the previous paragraph. Let us illustrate these possibilities with the help of an example that figures prominently in this survey. One important theory of wage determination is the so-called "gift exchange version" of efficiency wage theory (Akerlof 1982; Akerlof and Yellen 1990). This theory is based on lots of sociological and psychological research which supports the conclusion that the labour relation can often be characterised in terms of a "gift exchange" between workers and firms: firms voluntarily pay their workers above the next best alternative and workers respond with above-minimum work effort. Such behaviour can result in sticky wages and involuntary unemployment.

A first possibility to evaluate such an argument is to conduct *survey studies* and to interview personnel managers and other labour market participants about the determinants of their wage policy. Bewley (1999) is a particularly elaborate survey study (but see also Kahneman, Knetsch and Thaler 1986; Blinder and Choi 1990; Agell and Lundborg 1995; Campbell and Kamlani 1997). A finding of these studies is, for example, that personnel managers actually point to the importance of generosity and work morale in a way that is consistent with the gift-exchange version of efficiency wage theory. A second possibility is to conduct *case studies*. A recent example is Burks (1999) who argues that gift exchange motivations are important in the motor freight industry. Third, the most common possibility for economists is to perform econometric analyses of naturally occurring *field data*. For example, Krueger and Summers (1988), who, among others, found econometric evidence of non-compensating wage differentials, speculated that they may be explained by fair wage-effort or gift exchange considerations.

All three methods have their strengths and weaknesses. Economists are often not very fond of survey methods because they prefer *revealed* rather than *reported* behaviour. Case

studies tend to be 'special cases' and it may be hard to generalise from them. Econometric studies with field data often lack appropriate data. And so on.

The issues we want to investigate in this paper are very hard, if not impossible, to study with field data. For example, we will demonstrate the power of gift exchanges as an explanation for various labour market phenomena. How can we assess the relative impact of gift exchanges if we observe successful cooperation in a naturally occurring employment relationship? The survey results, if we trust them, probably offer some hints. However, in real world contracting relationships there are always various intervening factors and motivations inextricably present at the same time. In a strict sense, therefore, survey studies and case studies, as well as field data, can only produce evidence that is *consistent* with a particular theory, but other theories may be consistent with the same outcome as well.

In addition, for many of these issues, all these problems are intensified by a lack of appropriate field data. How can we unambiguously measure a gift-exchange relationship that rests on reciprocal *preferences*? How can we measure "wage flexibility" and "wage rigidity" and causally link them to gift exchange motivations? Further examples of empirical difficulties are provided by various theories on incentive schemes that depend on data of the utility function that are inherently unobservable to the researcher.

The tools of *experimental economics* offer a way out of these problems. Laboratory methods allow the mapping of a particular model with its assumptions (including preferences) and environmental conditions into an economic situation in which real people have to make real economic decisions that involve monetary payments. (In *all* experiments that we will discuss in the following, participants received monetary payments according to their decisions.) Moreover, decisions take place under *controlled conditions,* like, e.g., anonymity. By stripping down an economic situation to its essential features we can – in a nutshell – unambiguously test the behavioural importance of some arguments as an explanation for naturally occurring phenomena. For example, we will demonstrate the occurrence of sticky wages in the laboratory and *causally* link them to gift exchange considerations. Hence, the decisive comparative advantage of laboratory methods is that one can control the decision situation and thereby exclude various intervening outside factors that plague empirical work on such issues. Moreover, one can test comparative static predictions and (counterfactual) consequences of institutional changes.

Sceptics may argue that one cannot learn much from these experiments because (i) stakes are usually "low", (ii) the students that are the subjects of most experiments lack the experience of most labour market participants and that (iii) the experiments are often artificial and lack context. These are, of course, very serious issues, and experimental economists are very well aware of them. For that reason, a lot of experiments discussed below were conducted to test these objections. However, we can assure the reader already at this place that (i) different stake *levels* do not lead to strikingly different behaviour; (ii) there are some surprising subject pool effects and that (iii) context and the decision frame matter to some degree in particular in strategically complicated decision situations.[1]

Despite the comparative advantages of experimental methods we would like to point out that we view experiments as a *complementary method* to all other methods of data gathering. After all, experiments can only help to validate an argument. The relevance of laboratory findings has to be evaluated in naturally occurring situations. We believe, however, that the

[1] See Cooper, Kagel, Lo and Wei (1999) for an interesting study on interaction effects of subject pool and decision context in a strategically complicated game. See Hey (1991, Part I), Davis and Holt (1993, Chaps. 1 and 9) and Friedman and Sunder (1994) for further methodological discussions.

laboratory findings in many cases support the evidence from the other methods. Together, the different methods may help to improve the behavioural foundations of labour economics (see Agell 1999, Bowles and Gintis 2000, and Kaufman 1999 for many arguments and findings from the other social sciences).

In the rest of this survey we will proceed as follows. We set the stage in Section 2 by first discussing the central role of contractual incompleteness in labour relations. We will review evidence that most people use the behavioural discretion that comes with contractual incompleteness in a reciprocal way. In Section 3 we will present experiments that were designed to test the explanatory power of reciprocity for various labour market phenomena that are hard to explain from the neo-classical viewpoint: rent-sharing and non-compensating wage differentials, endogenous wage rigidities, and the absence of entrance fees. Section 4 takes a closer look at employment relationships that are, mostly, long-term and social relationships. We will present experimental studies that evaluate the relative importance of these two elements in the presence of incomplete employment contracts.

In Sections 2 to 4 we deliberately present experiments where firms can only pay fixed wages and where – with some exceptions – no incentive contracts were possible. In Section 5 we change this focus by presenting experimental tests of various incentive schemes that are also used in reality and/or that have been proposed by theorists. We concentrate on the interplay of trust and voluntary cooperation, and explicit incentives. Section 6 concludes.

2. Consequences of incomplete employment contracts

A central observation about labour markets is that *labour relations are typically contractually incompletely regulated*. In incomplete contracts not all relevant aspects are comprehensively determined, and/or important aspects are not enforceable by third parties like the court. Very often the employment contract just stipulates a wage payment; many details that actually determine performance are not specified in the contract (see Milgrom and Roberts 1992, Chap. 5, for an illuminating discussion of the various reasons for contractual incompleteness). Under conditions of incompletely specified obligations and only weak or absent explicit performance incentives the issue of motivation arises. How can a firm motivate their employees to put forward an efficiency-enhancing effort level if effort is not fully contractually determined? Milgrom and Roberts (1992, p. 127) make the point very clear:

> "In principle, a perfectly fashioned **complete contract** [emphasis in original] could solve the motivation problem. It would specify precisely what each party is to do in every possible circumstance and arrange the distribution of realized costs and benefits in each contingency (including those where the contract's terms are violated) so that each party individually finds it optimal to abide by the contract's terms. [...] *motivation problems arise only because some plans cannot be described in a complete, enforceable contract* [emphasis in original]."

Notice that contractual incompleteness as defined here is of course not confined to employment relations but is prevalent in many business relations as well (see, e.g., Macaulay 1992; Milgrom and Roberts 1992, Hart 1995).

An implication of contractual incompleteness is that it opens up the room for *social norms* to govern behaviour. *Reciprocity,* in particular, may influence economic actions. For

example, if employees choose their effort in reaction to the "generosity" of the firm's wage offer, firms may have an incentive to pay non-market clearing "efficiency wages" and thereby making a "gift" to the employees. In essence, this is what the "fair-wage effort hypothesis", or the "gift exchange hypothesis" of efficiency wage theory stipulates.

In the following we present a version of the gift exchange game that has been introduced into the literature by Fehr, Kirchsteiger and Riedl (1993, 1998) for the purpose of testing the gift exchange hypothesis. In the version of Falk, Gächter and Kovács (1999) and Gächter and Falk (2001) the potential role of reciprocity can be tested in a multiple *one-shot* gift exchange game. No form of reciprocal altruism, or any repeated game effect in general is possible in this design. This experiment, therefore, allows determining the importance of genuine reciprocity. We will describe the basic design in some detail because many of the experiments described in this survey incorporate a similar structure.

At the beginning of an experiment subjects are randomly allocated to their roles as 'firms' and 'workers', respectively (for simplicity we will henceforth call these subjects 'firms' and 'workers', respectively). The experimental game they play is a bilateral version of the so-called *'gift exchange game'*. In the **first stage**, subjects in the role of a firm make an employment offer to a particular worker. This employment offer consists of a *wage* offer. Wages have to be integers between 20 and 120 and the available effort levels are between 0.1 and 1 with increments of 0.1. In a given period each firm is paired with one given worker. After firms have made their wage offers, subjects in the role of workers, who have accepted that offer, have to make an effort decision at the **second stage** of the game. That is, workers have to determine their *actual effort level*. A worker's choice of an effort level is associated with costs for the worker as indicated in the following table. All participants are informed about the feasible effort levels and the costs of effort.[2]

Effort levels e and costs of effort $c(e)$

e	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
$c(e)$	20	21	22	24	26	28	30	32	35	38

After firms are informed about the effort decision of 'their' worker, the second stage is completed and payoffs can be calculated. A worker's payoff π^W at the end of the second stage is given by

$$\pi^W = w - c(e) \quad \text{upon acceptance}$$
$$\pi^W = 0 \quad \text{otherwise}$$

where w denotes the accepted wage and $c(e)$ the costs of the worker's actual effort. In case a worker does not trade, she earns nothing. A firm's payoff π^F is

[2] 'Effort' can be interpreted as the monetary equivalent of the disutility of work, which increases in the effort level. The important point of this design feature is that it sets incentives that can be thought of being 'isomorphic' to real world effort choices that are perceived as being onerous. See Fahr and Irlenbusch (2000) and Sonnemans, van Dijk and van Winden (2001) for experiments with '*real* effort'.

$$\pi^F = (v - w)e \quad \text{upon acceptance}$$
$$\pi^F = 0 \quad \text{otherwise}$$

where v denotes a firm's redemption value, i.e., the maximal gross profitability of a worker for the firm (provided $e = 1$). (Functional forms for firms are chosen to exclude the possibility of losses.) In the experiments v was set to 120. Again, all subjects knew these payoff functions. After the experiment, subjects were paid according to their decisions and according to their payoff functions.

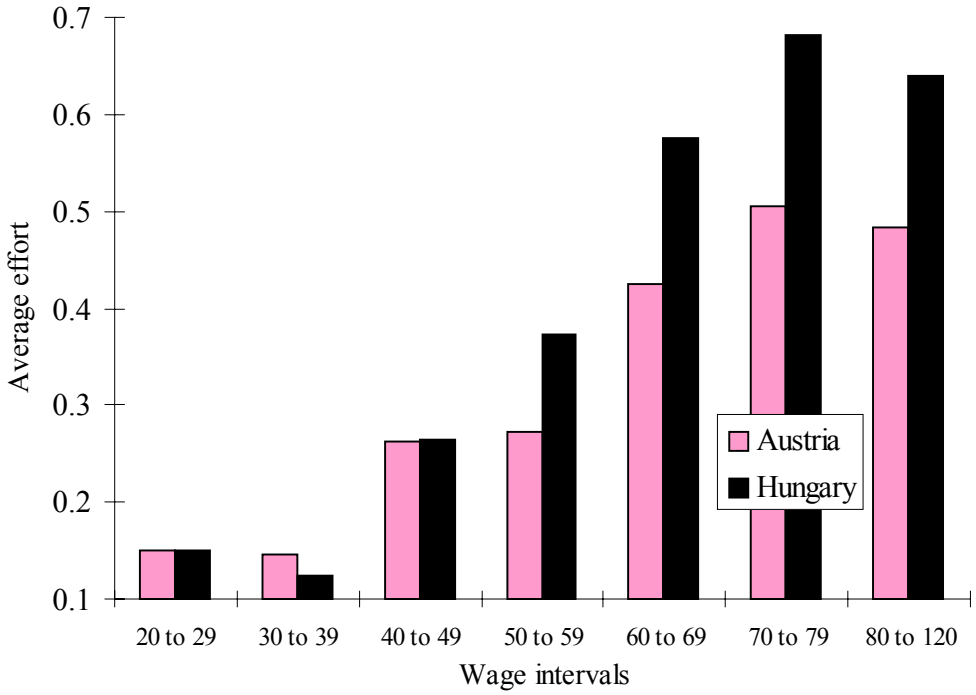
Besides the studies of Falk, Gächter and Kovács (1999) and Gächter and Falk (2001), there exist several other gift exchange experiments (discussed below). However, the crucial feature of the present design is that it completely rules out any form of individual reputation formation. In these experiments there are ten periods and in each period each firm is exogenously and anonymously matched with a *new* worker. Thus, the probability of meeting the same subjects twice is zero, while in the above-mentioned other gift exchange experiments this probability was positive. Therefore, the results in our experiments cannot be explained by the expectation to meet the same partner again in the future.

This two-stage design reflects a basic feature of most *employment relationships*, namely the incompleteness of the labour contract discussed above. Firms are neither able to condition *in a legally enforceable way* their wage payment on a particular effort, nor can they condition the wage on unambiguously verifiable output measures. Therefore, workers in the real world almost always have considerable discretion in determining their actual effort. In Gächter and Falk (2001) the only enforceable effort level is the minimum effort level of 0.1, for rational and selfish workers will – *regardless* of the wage payment – always choose $e = 0.1$. Firms, therefore, have no reason to pay more than $w = 21$, which is just enough to induce a selfish worker to accept the contract.

While selfishness predicts the choice of an effort level of 0.1 that is independent of the paid wage, *reciprocity* predicts an increase of the effort choice in the offered wage. A worker may perceive a generous wage as a 'gift'. If she is reciprocally motivated, she may feel a desire to repay the gift with an above-minimal effort choice. To the extent that such a voluntary 'gift exchange' between the worker and the firm actually takes place, efficiency is increased in this game with incomplete contracting.

The results of the one-shot experiments conducted in Austria (by Gächter and Falk 2001) and in Hungary (by Falk, Gächter and Kovács 1999) are summarised in Figure 1. Figure 1 impressively shows that – contrary to the selfishness prediction – workers choose effort levels that increase in the offered wage payment. This holds for both countries, despite some level differences. Put differently, in both countries sufficiently many people are motivated by reciprocity. This makes it worthwhile for firms to offer generous wages. Reciprocity clearly mitigates the cooperation problem in the gift exchange game. Gächter and Falk (2001) also perform a detailed analysis of the individual data and find that reciprocity is also dominant at the individual level.

Figure 1: Reciprocity in the one-shot gift exchange game.



Sources: Gächter and Falk (Austria); Falk, Gächter and Kovács (Hungary).

Meanwhile – beginning with Fehr, Kirchsteiger, Riedl (1993, 1998) – this kind of reciprocal behaviour has also been observed in numerous gift exchange games under various institutional conditions and in various countries.[3] In particular, Fehr and Tougareva (1996) investigate the effect of stake size on reciprocal behaviour. Charness (1996; re-examined in Charness and Haruvy 1999) studies the role of attribution. Charness (2000) tests the "responsibility-alleviation effect", which states that "shifting the responsibility for outcomes to an external authority dampens internal impulses toward honesty, loyalty, or generosity" (p. 375). Charness, Frechette and Kagel (2001) investigate the robustness of laboratory gift-exchange with respect to different presentations of payoff functions. Fehr, Gächter and Kirchsteiger (1997) and Fehr and Gächter (1998) enlarge the possibilities for reciprocation by adding a third stage with reward and punishment opportunities. Fehr, Gächter and Kirchsteiger (1993, 1997), and Fehr and Gächter (2001) investigate the impact of incentive contracts on reciprocal behaviour. Kirchler, Fehr, and Evans (1996), Fehr, Kirchler, Weichbold and Gächter (1998), Fehr and Falk (1999) and Brandts and Charness (2000) test the role of competition in reciprocal contract enforcement. Falk, Gächter and Kovács (1999) and Gächter and Falk (2001) – besides studying the baseline described above – also investigate the influence of repeated interaction and social approval incentives on reciprocal behaviour. Pereira, Silva and Andrade e Silva (2001) compare positive and negative reciprocity in the gift exchange game. Kirchsteiger, Rigotti and Rustichini (2000) study the impact of mood the willingness to engage in gift exchanges. Hannan, Kagel and Moser (1999)

[3] The gift exchange phenomenon was observed in experiments conducted in such diverse countries as Austria, Hungary, Portugal, Russia, Spain, Switzerland, The Netherlands, and the USA.

study different subject pools. Hannan (2000) investigates the role of firm profit for employee effort. van der Heijden, Nelissen, Potters and Verbon (1998; 2001) and Lensberg and van der Heijden (1998) examine 'simple and complex gift exchanges' in yet another variant of the gift exchange game. In the following two sections we will describe some results of these studies in more detail. Before we move on, it is worthwhile to discuss briefly the issues of (i) stake levels, (ii) subject pool effects and (iii) "framing" effects.

First, it seems that reciprocal behaviour is robust even under *high stakes conditions*. Fehr and Tougareva (1996) conducted gift exchange games in Russia in which subjects earned on average up to three months' income in a two-hour session. In a control session the earnings opportunity decreased by a factor of ten. They could not detect any effect of the stake level on the frequency or strength of reciprocal and selfish responses, respectively.[4]

Second, there is the issue of subject pool effects. For example, Hannan, Kagel and Moser (1999) find that undergraduate students – although they engage in gift exchanges – behave less reciprocally than their MBA counterparts.[5] Hannan, Kagel and Moser attribute the subject pool differences to different work experiences undergraduates and MBA students might have when they enter the laboratory. Most undergraduates work in minimum wage jobs where gift exchanges are less important than in the jobs in which most MBA's work. In contrast, in Fehr, Kirchler, Weichbold and Gächter (1998), subjects were soldiers with various social backgrounds. Their behaviour was not at all different from student subjects.

Third, there is the issue of context. In some gift exchange experiments (e.g., in Fehr et al. 1998) the game was framed as an employer-employee relationship. In others, e.g., in Fehr and Gächter 2001, the game was presented as a buyer-seller relation. Although the issue of this kind of 'context-framing' has not been investigated systematically, the resulting gift exchanges are qualitatively the same. Even quantitatively, results are very similar. Charness, Frechette and Kagel study another form of framing. They compare gift exchange games (with very similar parameters than those described above) where in one treatment subject are told the payoff functions (as in the experiments discussed above). In another treatment, subjects are given a payoff table in addition to the payoff functions. Interestingly, the presence of payoff tables lowered (but did not eliminate) gift exchanges and increased strategic behaviour. Kirchsteiger, Rigotti and Rustichini (2000) show that the subjects' mood during the experiment also affects gift exchanges. Research on this kind of issues has just begun. It is important to understand under which conditions stable gift exchanges will occur. Yet, these latter results (and further ones discussed in Section 5) notwithstanding, there are important domains in which gift exchanges turned out to be a very robust observation.

In the gift exchange game described above, the focus has been on positive reciprocity. Generous wage payments are reciprocated with generous effort choices. The question therefore arises whether *negative reciprocity* – the willingness to *punish* greedy behaviour – is also effective in increasing effort levels in the gift exchange game. To test this, Fehr and Gächter (1998) introduced a **third stage** into their design, in which firms had – in addition to an opportunity to reward their worker (i.e., to behave positively reciprocal as well) – the

[4] Cameron (1999), and Hoffman, McCabe and Smith (1996) also do not find 'stake effects' in their (ultimatum game) experiments. Slonim and Roth (1998) find some slight effects that depend on experience and the stake size. See Camerer and Hogarth (1999) for a very comprehensive meta-study of stake-level effects. Their meta-study of 74 experiments reveals that in strategically simple games like ours high stakes do not lead to a different behaviour than low stakes. In strategically complex games, however, higher stakes affect behaviour.

[5] Fehr and List (2002) get a similar result in an investment game conducted in Costa Rica, where CEO's were both more trustful and trustworthier than student subjects.

possibility to *punish* a worker. Both rewards and punishments were costly. Only no punishment or no reward was costless.

The data shows that the selfishness prediction is neither borne out in the two-stage experiment (conducted as a control), nor in the three-stage experiment where the punishment and reward opportunities were present. In the two-stage games, effort levels were on average above 0.4. In the three-stage experiments, the prospects of a punishment or a reward were obviously highly credible. The average effort level in the three-stage treatment amounts to e = 0.6 which is significantly higher than the effort level achieved in the two-stage treatment. In both conditions effort levels were stable over time.

The observation of positive reciprocity is not restricted to the gift exchange game. Berg, Dickhaut and McCabe (1995) have designed an 'investment game' that resembles the gift exchange game. In this game, a first mover can pass on money to a second mover. The amount sent is tripled. The second mover then has to decide how much money to give back to the first mover. Pecuniary incentives are such that a selfish second mover is predicted to keep the whole amount for himself. The first mover, who anticipates this outcome, is predicted to pass nothing to the second mover. Actual outcomes are markedly different, though. First movers pass on considerable amounts to the second movers who reciprocate by giving back some money. This result has by now been replicated several times and turned out to be robust in many variations and across cultures.[6] Positive reciprocal behaviour has also been observed in related one-shot 'trust games' (see Bolle 1998; Dufwenberg and Gneezy 2000), in the one-shot sequential prisoner's dilemma game (see e.g., Bolle and Ockenfels 1998; Clark and Sefton 2001) and – in the form of conditional cooperation – in one-shot public goods experiments (Ockenfels 1998; Fischbacher, Gächter and Fehr 2001). Hoffman, McCabe and Smith (1998) and McCabe, Rassenti and Smith (1998) investigate reciprocity in a specially designed extensive form game and relate the results to insights from evolutionary psychology.[7]

Negative reciprocity can as well be observed in other games, for example in the form of rejections of greedy offers in the 'ultimatum game' (see Güth 1995b, Roth 1995 and Camerer 2001, Chap.3, for surveys). In the public goods game with punishment, negative reciprocity takes the form of punishment of free riders by the contributors (Fehr and Gächter 2000).

The 'moonlighting game' (invented by Abbink, Irlenbusch and Renner 2000 and replicated by Fehr, Falk and Fischbacher 2000, and Cox, Sadiraj and Sadiraj 2001) nicely combines possibilities for positive and negative reciprocation. In this game player A can give player B any integer amount of money $g \in [0, 6]$ but, instead, he also can take from B any integer amount of money $t \in [1, 6]$. In case of $g > 0$ the experimenter triples g so that B receives $3g$. If t is chosen, player A reaps t and player B loses t. After player B observes g or t, she can pay A an integer reward $r \in [0, 18]$ or she can reduce A's income by making an investment $i \in [1, 6]$. A reward transfers one money unit from B to A. An investment i costs

[6] See Jacobsen and Sadrieh (1996); Croson and Buchan (1999); Fahr and Irlenbusch (2000); Ortmann, Fitzgerald and Boeing (2000); Buchan, Croson, and Dawes (2000); Cochard, Van Phu, and Willinger (2000); Buchan, Johnson and Croson (2001); Cox (2000, 2002); Glaeser, Laibson, Scheinkman, and Soutter, (2000); Dufwenberg, Gneezy, Güth and van Damme (2001); Fershtman and Gneezy (2001); Burks, Carpenter and Verhoogen (2001), and Camerer (2001, Chap. 3) for an overview. While the gift-exchange game was inspired by the 'fair-wage effort hypothesis (Akerlof 1982), the investment game was not designed to test issues from labour economics but to test for non-selfish motivations. The findings from the gift-exchange game and the investment game correspond nicely.

[7] Reciprocal preferences may very well have evolutionary roots. Explanations in this direction comprise Güth (1995a), Huck and Oechssler (1999), Bowles and Gintis (1998), Gintis (2000) and Sethi and Somanathan (2001).

B exactly i but reduces A's income by $3i$. In this game positive reciprocity occurs if $g > 0$ triggers $r > 0$. Negative reciprocity prevails if t leads to i. If players are selfish and rational the following outcome is predicted: B will always choose $r = 0$ because any other choice is costly. Therefore, A only loses if he chooses $g > 0$ and has nothing to fear if $t > 0$. As a consequence, A will choose $t = 6$.

The actual behaviour of subjects unambiguously rejects this prediction: (i) Roughly 75 percent of player A's choose $g > 0$, although $t = 6$ is predicted. (ii) On average, $g > 0$ elicits $r > 0$, so that positive reciprocity occurs. (iii) If A's choose $t > 0$ they are, in general, heavily punished by $i > 0$. In less than ten percent of the cases $t = 6$ is chosen.

In summary, meanwhile there is comprehensive evidence that a majority of people behaves reciprocally even under strict one-shot conditions with no material incentives to reciprocate. Such behaviour can be observed in a variety of different games and it has been replicated in various countries with different subject pools and under high stakes conditions. Camerer (2001, Chap. 3) provides a very comprehensive survey on the most important findings. In contractually incompletely regulated relationships there is room for behavioural discretion and most people use it in a reciprocal way. The fact that results are qualitatively similar across a range of games points to the robustness and importance of other-regarding preferences as opposed to the ubiquitous assumption of selfishness that governs most of (labour) economics.[8]

Since most employment relations are of necessity governed by incomplete contracts, the question of economic consequences for important issues in labour economics arises. First, one immediate conclusion from the above evidence is that the gift exchange version of efficiency wage theory (Akerlof 1982; and Akerlof and Yellen 1990) receives support from the laboratory. In this sense our results *complement* the findings from various survey studies mentioned in Section 1, which also corroborate the importance of gift exchanges, and the connection of "work morale" and "generosity". In the following section we further investigate the explanatory power of such "gift exchanges". Second, due to reciprocal behaviour the inefficiency problem inherent in contractual incompleteness is mitigated *for the contractual parties*, since actual effort levels are considerably above the predicted minimal (and inefficient) effort level of 0.1.

However, there is a caveat. Although reciprocity may be beneficial in a particular employment relationship, it may be detrimental for third parties. As it has been pointed out by Akerlof and Yellen (1990), fair wage-effort considerations may very well lead to involuntary unemployment (because employed workers enjoy a job rent), and, hence, result in an overall inefficiency.[9]

Falk and Fehr (1999) show that fairness considerations may indeed lead to unemployment. In their experiment a firm can in each period potentially conclude three contracts with homogenous workers. As it is usually assumed in labour market theory, the marginal product of labour is decreasing. In equilibrium, all three workers are profitable to the firm and should thus be employed. However, as the results of the experiment show, firms correctly anticipate that workers do not accept very "low" wages. Given the profitability of

[8]Meanwhile there are several theories of reciprocity that try to explain the above-mentioned laboratory data. See Rabin (1993), Dufwenberg and Kirchsteiger (1998), Levine (1998), Falk and Fischbacher (1999), Fehr and Schmidt (1999), Bolton and Ockenfels (2000), and Charness and Rabin (2001).

[9] A similar conclusion holds for the phenomenon of corruption, where the two parties involved benefit from reciprocal bribery. However, reciprocity-based bribery may have negative externalities. On an experimental test of these arguments see Abbink, Irlenbusch and Renner (2001).

the "marginal" worker, firms' best response is to offer only two contracts, which *endogenously* leads to unemployment.

With the help of a three-person ultimatum game, Okada and Riedl (1999a, 1999b) also present experimental evidence on this issue. In their design a proposer first has to make a choice between a three-person coalition and a two-person coalition, where the three-person coalition leads to a larger pie that can be distributed between the coalition members than the two-person coalition. Hence, it would be efficient to form a three-person coalition. After the proposer has made a decision about the size of the coalition, she has to propose a division of the pie between the coalition members who can reject the proposal (resulting in zero payoffs for all parties). Okada and Riedl show that expected negative reciprocal behaviour expressed in the form of rejections of proposed divisions, often leads to inefficient coalition sizes and hence to the "social exclusion" of one bargaining partner.

3. Investigating important labour market phenomena

Can *reciprocity* explain various naturally occurring labour market phenomena that are hard to explain from the viewpoint of the standard model that assumes purely selfish motives? In this section we present evidence that demonstrates the power of reciprocity in explaining important labour market phenomena that have puzzled researchers for some time.

These puzzles are often very hard to resolve with the naturally occurring field data. Experimental methods, therefore, have a comparative advantage in assessing the explanatory power of social motivations that may have shaped naturally occurring field data. The empirical phenomena we address in turn are (i) rent sharing and non-compensating wage differentials, (ii) wage rigidity, and (iii) the general absence of entrance fees, which should be prevalent given that workers, for whatever reason, enjoy job rents.

3.1 Rent sharing and non-compensating wage differentials

In the standard neoclassical theory of wage determination a firm's profit plays no role at all for the wages workers of a given skill level receive. In equilibrium, with selfish preferences, workers are just paid their reservation wage, i.e., the value of their best alternative job opportunity. Therefore, according to this model, workers do not enjoy job rents, i.e., wages above their reservation wage. However, much of empirical research on actual wage payments during the last decade has cast doubt on the empirical validity of this prediction. Recent micro-econometric evidence at the firm level supports the argument that wage payments contain some rent components. To mention just two examples, the papers by Blanchflower, Oswald and Sanfey (1996) and Hildreth and Oswald (1997) show that there is a positive relation between long-run wages and the lagged profitability of non-unionised companies or non-unionised industries, respectively. While rent-sharing theories of the labour market predict this correlation, it is not consistent with competitive theories.

Can *reciprocity* account for such a positive correlation between profitability and wages? The previously discussed gift exchange experiments already show unambiguously that workers earn rents. The reservation wage, which was set by the experimenter, was below the actual contract wage. In these experiments a majority of subjects actually is reciprocally

motivated and it therefore pays for the firm to share the rent. Falk, Gächter and Kovács (1999) analyse rent sharing at some detail and find that equitable sharing is very important in explaining both observed wages and effort levels.

Rent sharing is also predicted by social psychological equity theory. According to equity theory people feel entitled to – and hence aim at – a share of the 'output' that equals their 'input share' used in the production of that output. Social psychological research has already established several decades ago the importance of equity in labour relations (see, e.g., Adams 1965, and Walster and Walster 1978; in economics, equity theory is discussed in Selten 1978 and Güth 1994). Königstein (2000, Chap. 1 and 3) and Gantner, Güth and Königstein (2001) present experimental evidence on this in the context of bargaining over the proceeds of joint production. In the experimental designs employed in these papers the two bargaining partners first both have to make a production decision (i.e., determine an "input") after which they bargain over the division of the jointly produced pie (i.e., the "output"). The designs are such that standard economic theory and equity theory make distinct predictions. All three papers report considerable support for equity theory over standard economic predictions, although it turns out that different people employ different equity standards.[10]

In summary, these findings suggest that to the extent that contracts are incomplete and/or wages are determined via bargaining between employers and employees, some rent sharing will occur. Equity standards and reciprocal behaviour are expected to significantly affect the bargaining outcome.

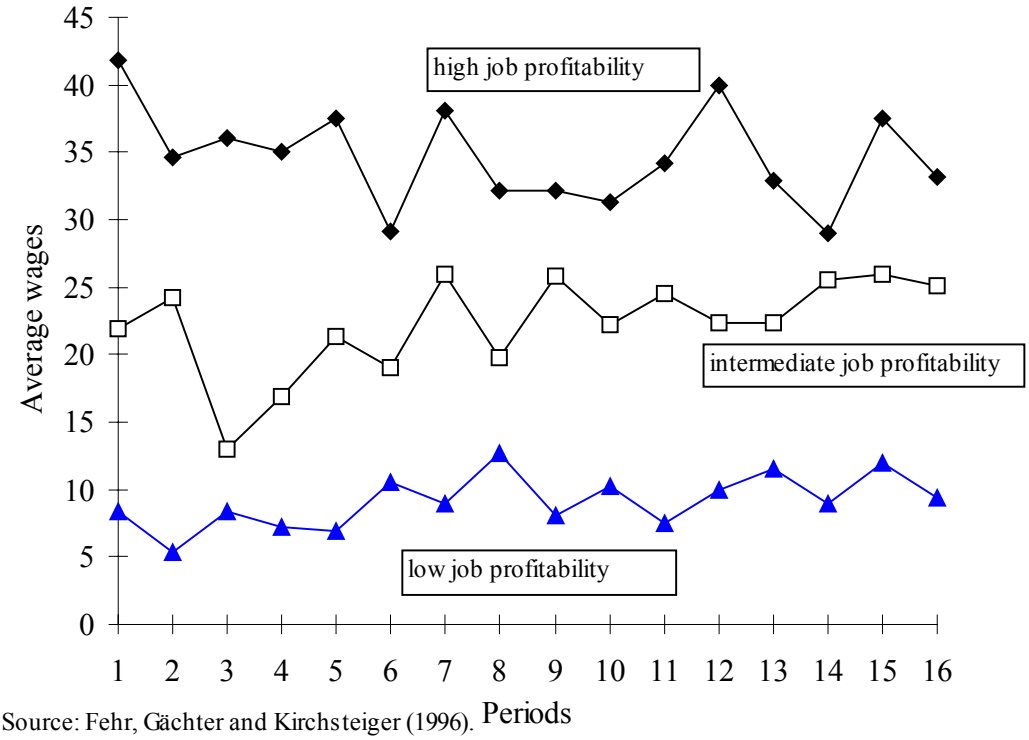
A related finding to rent sharing is the existence of inter-industry wage differentials. Even after controlling for a large number of job-, and worker-related characteristics, and demographic variables, large and statistically significant industry wage differences remain. Moreover, these differences exist for union as well as for non-union workers and seem to be remarkably similar (i) across countries with different labour market institutions, (ii) across occupations and (iii) across time. These observations clearly violate the 'law of one price', because, apart from compensated differences, homogeneous work should have the same price. In violation of the 'law of one price', two particularly interesting facts are that (a) high profit industries tend to pay high wages and (b) if one occupation in an industry is highly paid, all other occupations in that industry also tend to pay high wages (Dickens and Katz 1987; Krueger and Summers 1988; Katz and Summers 1989). If workers' perception of what constitutes a fair wage level is positively correlated with firms' profit opportunities, high profit firms are forced to pay a higher wage to elicit a *given* level of effort. Moreover, if higher profit opportunities are associated with a higher marginal product of effort, firms with high profit opportunities have an incentive to elicit higher effort levels. Both reasons may be responsible for the observed positive correlation between profits and wages in the field data. Hence, it may well be that rent sharing contributes to non-compensating wage differentials.

As shown in the previous sub-section, in experiments with incomplete labour contracts rent sharing *is* a common phenomenon. To investigate the impact of rent sharing on wage differentials, Fehr, Gächter and Kirchsteiger (1996) have conducted gift-exchange experiments in a competitive market environment. To test for the consequences of different profit opportunities experimental firms differed according to the profitability of a given job. There were three levels of job profitability (i.e., the redemption value v in the firm's payoff function described above): v was high, intermediate or low. Firms with a high level of job

[10] Ruffle (1998) also finds evidence for equity theory in the context of dictator and ultimatum games in which the recipient produces a pie according to her success in a skill contest.

profitability earned more per employed worker than firms with intermediate and low levels, respectively. To test for inter-temporal stability, the experiment was repeated 16 times. Theoretically, under the standard assumption of selfishness, firms' profitability should not have any impact on wage payments, i.e., there should be no wage differentials. Figure 2 gives the results.

Figure 2: Wage differentials over time for different levels of job profitability for the firm.



Source: Fehr, Gächter and Kirchsteiger (1996).

In sharp contrast to the neoclassical prediction, profit opportunities actually do influence wage payments. In the experiments, firms that were assigned high levels of job profitability paid higher wages than firms with intermediate and low levels of job profitability, respectively. Furthermore, the wage differentials are stable over time. By design, neither unobservable heterogeneity in working conditions, nor unobservable heterogeneity in skill levels, can be made responsible for these wage differentials. Hence, in support of arguments made by, e.g., Krueger and Summers (1988), we conclude that fair-wage effort considerations and the implied rent sharing can indeed explain non-compensating wage differentials.

It should be noted that the fair-wage effort hypothesis is not the only efficiency wage theory that can explain wage differentials. The so-called "shirking version of efficiency wage theory" that has been developed by e.g., Shapiro and Stiglitz (1984) and others, can also explain wage differentials. The shirking version is essentially a theory of involuntary unemployment that arises because of a *moral hazard* problem. In these models, firms pay incentive-compatible efficiency wages to prevent workers from shirking. Fehr, Kirchsteiger and Riedl (1996) have developed a simplified version of the shirking model and subjected it to an experimental test. As in Fehr, Gächter and Kirchsteiger (1996), firms differ in the

assigned levels of job profitability. In contrast to the previous design, however, firms can verify shirking with a certain probability and punish shirking workers with a wage reduction.

The efficiency wage model of Fehr, Kirchsteiger and Riedl (1996) contains many testable predictions. For our present purposes the most important prediction is that there are non-compensating wage differentials: the higher a firm's job profitability, the higher is the optimal wage that is paid by the firm. The reason is that firms with higher job profitability demand higher effort levels and therefore have to pay higher wages to prevent shirking. The experimental results confirm this prediction.

In summary, two theories that predict wage differentials – the fair-wage effort hypothesis and the shirking version of efficiency wage theory – receive support in the laboratory. Hence, they are valuable candidate theories for the explanation of observed wage differentials outside the laboratory.

3.2 Wage rigidities and the role of competition

The presence of wage rigidities is one of the most important open questions in modern macroeconomics. Sticky wages have not only been made responsible for involuntary unemployment but also for business cycle fluctuations and real effects of monetary shocks. As long as rigid wages are not the result of some governmental regulation or of union power, they are hard to explain from a neoclassical point of view. The challenge is to find *endogenous* reasons why wages may be sticky. One of the many arguments that have been proposed in this direction is gift exchange theory (e.g., Akerlof 1982). Given that a gift exchange mechanism is at work, firms have no interest in lowering wages.

All our gift exchange experiments have produced results that are consistent with this argument. Wage *levels* are a function of rent sharing, but for a given job profitability, wages are sticky. As Figure 2 shows wages do not decline to the predicted level.

What is the impact of competition on wage rigidity? Fehr, Kirchler, Weichbold and Gächter (1998) report the first experiment that assesses the impact of competition on wage rigidity and gift exchanges. In this study, the gift exchange game is played in three different treatments. The first is a *'Bilateral Gift Exchange treatment'*, in which a given worker-firm pair remains paired for ten periods (as in Falk, Gächter and Kovács 1999 and Gächter and Falk 2001). The second treatment is a *'Gift Exchange Market'* in which there is an excess supply of labour and in which firms make wage offers in a one-sided oral auction. To assess the impact of contractual incompleteness on the wage formation process a *'Complete Contract Market'* is conducted in which there is no incomplete contract anymore because the effort level has been exogenously set to $e = 1$. Hence, the worker has no effort discretion anymore and has only to decide about acceptance or rejection of a wage offer.

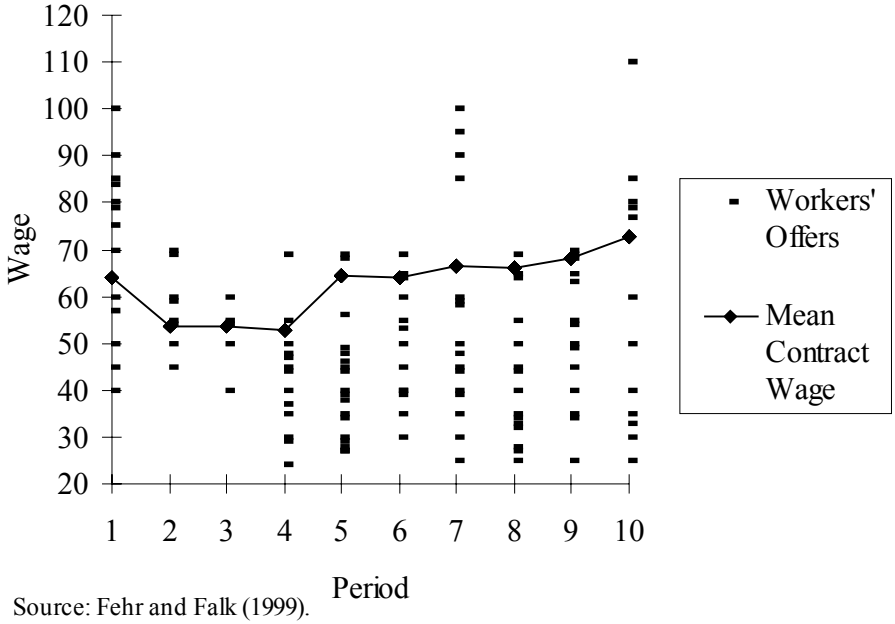
In the gift exchange treatments the observed reciprocal behaviour is very similar to the one reported in Figure 1. Moreover, reciprocal responses are almost identical in the 'Bilateral Gift Exchange' and the 'Gift Exchange Market'. Second, average wage levels are also almost identical in these two treatments. Thus, competition seems to have a negligible effect on the formation of prices in markets with incomplete employment contracts. In the 'Complete Contract Market', however, where the effort level is exogenous and where, hence, there is no scope for positive reciprocity, wages actually decline over time.

The experiments by Fehr and Falk (1999) investigate wage rigidities in a particularly strong setup. In their experiments both firms and workers can engage in bidding, i.e., in their

experiments wages are formed in a '*double oral auction market*'. Both workers and firms can make wage offers and demands, respectively. Firms are not forced to accept the lowest wage offer. In all other respects the experiments are similar to the ones by Gächter and Falk (2001) described in Section 2. Fehr and Falk (1999) compare two treatments: a double auction market with *incomplete contracts*, i.e., one where firms cannot condition their wage payment on an effort level and where workers do have effort discretion, and a double auction market with *complete contracts.* In these experiments the effort level is held fixed by the experimenter. The interpretation is that a homogeneous good of known and enforceable 'quality' is traded. This is the standard setup of dozens of market experiments (see Holt 1995 for an overview). Figures 3a and 3b show the most important results.

First, as Figure 3a demonstrates, workers indeed engage in considerable underbidding, but *firms refuse to accept low offers.* The reason is, once again, the workers' reciprocal behaviour: once a worker is employed, her effort decision depends positively on the received wage. This gives firms – even in such a highly competitive environment as a double auction – an incentive to pay generous and stable "efficiency" wages.[11] Figure 3b is testimony to the fact that the former result is not due to an impeded functioning of markets. With complete contracts, where workers do not have the possibility to behave positively reciprocally (though they still have the opportunity to reject wage offers), wages actually decline to very low levels. Firms now do take advantage of worker's underbidding.

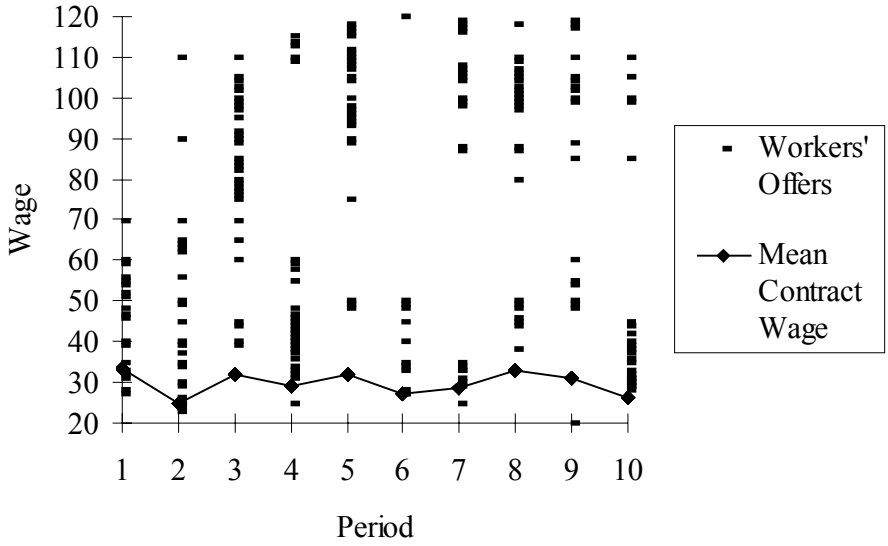
Figure 3a: Workers' offers and mean contract wages in the market with *incomplete* contracts



Source: Fehr and Falk (1999).

[11] See Dufwenberg and Kirchsteiger (2000) for a theoretical account of this finding.

Figure 3b: Workers' offers and mean contract wages in the market with *complete* contracts



Source: Fehr and Falk (1999).

Several survey studies corroborate these findings (see, e.g., Agell and Lundborg 1995; Campbell and Kamlani 1997, Bewley 1999). According to these studies, firms are even reluctant to hire under-bidders because they fear this would have a detrimental influence on work morale. This finding is fully compatible with the laboratory results. Both the survey results as well as the experimental findings do not support Solow's (1990) argument that there may exist a social norm against underbidding. If there is such a norm it is, as Figure 3b shows, overpowered by competitive forces. In the experiments with incomplete contracts (Figure 3a) wage declines are prevented by reciprocity and not by a social norm against underbidding.

In contrast to the market experiments of Fehr, Kirchler, Weichbold and Gächter (1998), and Fehr and Falk (1999), Burda, Güth, Kirchsteiger, and Uhlig (1998) investigate the issue of wage rigidity in the context of a two-period *ultimatum game*. In their experimental setup there is an exogenously given wage – to be interpreted as a "competitive wage" – that declines from period 1 to period 2. The surplus of an employment relationship minus the competitive wage is constant between the two periods. Firms offer complete employment contracts by making take-it-or-leave-it wage offers to workers who do not have effort discretion. If a worker rejects a wage offer the firm can "hire" another worker at the exogenously set competitive wage. According to standard theory, firms are predicted to take advantage of the declining competitive wage and to offer lower wages in period 2. The experimental results are roughly in line with this prediction. Hence, in these ultimatum game experiments with complete contracts, wages also do not exhibit downward rigidity.

In summary, with *complete* contracts competition leads to wages that are close to the ones predicted by standard economic theory. In this respect the results from the market experiments are grossly in line with those of numerous other market experiments (see Holt 1995 for an overview). In ultimatum games with complete contracts wages are downwardly flexible as well. With *incomplete* employment contracts, however, wages are – due to reciprocal behaviour within an employment relationship – very insensitive to the amount of

competition. These results suggest that labour markets that are characterised by complete contracts will roughly work as predicted by neo-classical labour market theory. However, labour markets, where employment relationships are inherently contractually incomplete, will exhibit wage rigidities. This outcome is expected even if the labour market is in all other respects completely unregulated and competitive.[12]

3.3 The absence of entrance fees

If workers, once they are on the job, earn rents because rents are necessary to ensure profitability-enhancing effort choices (i.e., workers earn 'efficiency wages'), the workers should be willing to make an up-front lump-sum payment to buy these rents. In other words, in a competitive market, they should be willing to pay an 'entrance fee' into the job at a price that equals the rent earned later on. Since this entrance fee is a lump-sum payment that is, moreover, paid up-front, it should not affect performance incentives on the job. Therefore, if efficiency wage considerations generate *ex post* rents, firms in competitive markets are predicted to charge entrance fees. Since, however, we do in general not observe entrance fees in real-world labour markets, workers do in fact not earn true *ex post* rents (see Carmichael 1985 for a formulation of this statement). This is a fundamental point. If true, there cannot be involuntary unemployment that arises solely from efficiency wage considerations. No worker earns a rent and, hence, the market clears.

If labour market participants would indeed all be selfish, it is difficult to find reasons for the absence of entrance fees, if workers actually earn on-the-job rents. If, however, fairness and reciprocity motivate sufficiently many labour market participants, they may denounce an entrance fee as very unfair. Entrance fees, if observed, could then lead either to a rejection of the contract, or to very low performance levels. Put differently, entrance fees – although they are up-front lump-sum payments – would not be behaviourally neutral. Hence, the absence of entrance fees could therefore also be due to anticipated negative behavioural effects of such payments.

It is hard to test such (counterfactual) arguments outside the laboratory. Therefore, Fehr, Gächter and Kirchsteiger (1993) have tested consequences of entrance fees in a labour market experiment where firms had an incentive to pay efficiency wages (with the implication of on-the-job rents) to minimise shirking on the job (see Shapiro and Stiglitz 1984 and the experiment by Fehr, Kirchsteiger and Riedl 1996). The market institution was a posted-bid market. The experimental design also explicitly allowed for 'up-front lump-sum payments' from the workers to the firms. The experimental parameters were such that 'up-front lump-sum payments' should show up if the entrance fee argument is correct. However, the design also allowed for positive 'up-front lump-sum payments' from the firms to the workers (i.e., the 'opposite' of an entrance fee).

The experimental results are again compatible with reciprocity and reject the implications of the selfishness assumption. On average, no entrance fees were observed. To the contrary, firms offered substantial *positive* up-front payments to the workers. Firms that actually tried to collect entrance fees did not succeed at all. Their contracts were either rejected or workers' performance was at its lowest possible level. Moreover, the higher the positive up-front

[12] See Burks (1999) for an interesting case study from the motor freight industry.

payment to the workers the higher was the effort choice. Hence, although these payments are up-front and lump sum, they are not behaviourally neutral if people are reciprocally motivated. Again, since the majority of people is motivated by reciprocity considerations, it is not in the interest of the firms to demand entrance fees. These results suggest that reciprocity can explain the co-existence of on-the-job rents and the absence of entrance fees.

4. The employment contract as a long-term and social relation

Although some economic transactions resemble the anonymous one-shot games studied above, many economically important cooperation problems, most notably the employment relation, are markedly different. They do *not* take place only once and under such a restricted interaction structure as in the above experiments. The labour relations people interact repeatedly, which offers them many possibilities for reciprocation, reputation formation, and social exchange.

Laboratory experiments offer the unique possibility of changing the institutional conditions under which behaviour takes place in a controlled way. In the following we present evidence on the impact of two such institutional conditions on voluntary cooperation in incompletely regulated social relationships. In particular, the experiments reviewed below had the purpose of determining the relative importance of (i) repeated interaction, and (ii) social exchange incentives that characterise many employment relationships. The benchmark for all these institutional variations is provided by behaviour under one-shot interactions.

4.1 The efficiency of long-term interaction

In the parlance of game theory long-term labour relations can be modelled as 'repeated games'. In contrast to our one-shot games, in *infinitely* repeated games it is well known from so-called 'folk theorems' that cooperation is compatible with selfishness (in the context of employment contracts see, e.g., MacLeod and Malcomson 1998). Even in *finitely* repeated games, it is possible to sustain cooperation over some time, provided rationality and selfishness are not 'common knowledge' (see Kreps, Milgrom, Roberts, and Wilson 1982).

In the last sections we have seen that a majority of people is reciprocally motivated. This suggests that some people also behave reciprocally in the repeated games; but now even those who are completely selfish may have material incentives to cooperate. This mixture of reciprocal and material incentives to cooperate may actually have interesting interaction effects. For instance, it may give the selfish subjects an incentive to imitate the reciprocal ones.

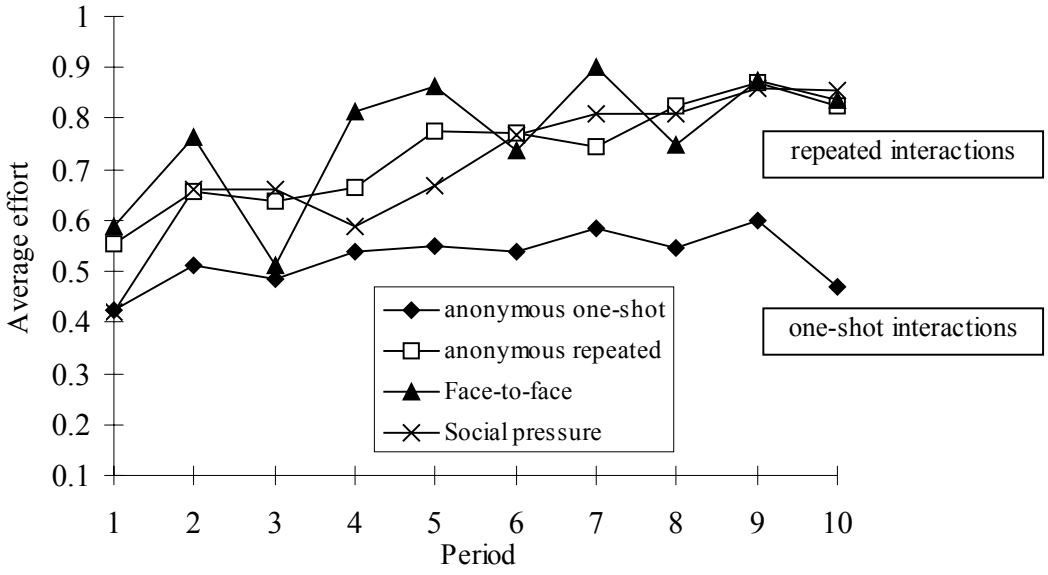
Thus, it is a challenge to understand *how* reciprocal and selfish subjects behave in a repeated interaction. Our experiments may help to pin down the empirically relevant regularities of behaviour in repeated gift-exchange situations. From an economic viewpoint the most important question is whether the mere fact of repeated play can actually help to attenuate the efficiency problem.

The experiments by Falk, Gächter and Kovács (1999) and Gächter and Falk (2001) address exactly this question in the context of the gift exchange game. As already mentioned, in both studies the baseline treatment was a so-called 'One-Shot-treatment', which is a

sequence of one-shot games, played in each period by different worker-firm pairs. In both studies other treatment conditions consisted of *finitely* repeated gift exchange games in which each subject interacted ten times with the same opponent. The comparison of these two treatments allows the separation of the impact of a repeated interaction with the same opponent on cooperation from a pure reciprocity effect.

Figure 4 shows the result of the one-shot interactions and of three different repeated game interaction treatments (to be explained in more detail in the next sub-section). There is actually a high benefit of a repeated interaction. Average effort levels in the repeated games are about 0.75 as compared to 0.5 in the one-shot interaction. Hence, contributions in the repeated game treatments clearly improved efficiency relative to the 'One-Shot-treatment'.[13]

Figure 4: Average effort over time in a gift exchange game in repeated and random interactions in anonymous and non-anonymous conditions.



Source: Falk, Gächter, and Kovács (1999).

Gächter and Falk (2001) qualitatively replicate this result. The main difference to Falk, Gächter, and Kovács (1999) is that in the repeated game they find an 'endgame effect', i.e., a considerable drop in effort levels in the final period. Although wages did not fall, the average effort fell to about the levels of the one-shot game. The average effort level in the final period of the repeated game and the average effort in the final period of the one-shot game are not statistically significantly different. In a detailed statistical data analysis at an aggregate and individual level, Gächter and Falk (2001) show that some subjects in the repeated game actually *imitated* reciprocal play and reverted to their selfish strategy by the last period. The majority of subjects (at least 50 percent) is driven by a reciprocal motivation. As an upper bound, the behaviour of at most 30 percent is compatible with selfish reputation formation.

[13] In public goods experiments similar results are observed in comparisons of one-shot and repeated interactions. Repeated interactions clearly improve cooperation rates in most experiments. See Croson (1996), Keser and van Winden (2000) and Keser (2001) for further results and a discussion.

Cochard, Van Phu and Willinger (2000) are also interested in the effects of repetition on cooperative behaviour. They compare a finitely repeated investment game (of 7 rounds) and a sequence of seven one-shot investment games. They find, on average, that in the repeated game senders send more and receivers return more than in the one-shot games. They also find a severe drop in returned amounts in the final period of the repeated game, although the sender's investment levels were not different between conditions. Thus, the results from the repeated and one-shot gift-exchange games and the respective investment games correspond nicely.

The experiments by Falk, Gächter and Kovács (1999), Gächter and Falk (2001), and Cochard, Van Phu and Willinger (2000) show that a repeated interaction is itself able to mitigate the contract enforcement problem. To achieve a treatment comparison with one-shot contracts, the duration of the employment relation has been set exogenously in these experiments. This is in contrast to Anderhub, Königstein and Kübler (1999) who, in their experimental design, *endogenise* the length of the employment contract. Moreover, they investigate the relationship between firm-specific human capital investment and the employment duration. The formation of firm-specific human capital can provide a rationale for a long-term employment relation that is independent of the rationale given by the presence of reciprocal behaviour under incomplete contracts.

Anderhub, Königstein and Kübler (1999) endogenise contract length in a two-period game by giving firms the possibility to offer a 1-period contract (a 'short-term contract') or a 2-period contract (a 'long-term contract'). A firm can employ one worker two times under a short-term contract (i.e., rehire the worker in period 2), sack a worker after period 1 and hire a new one in period 2, or employ the same worker with a long-term contract. Workers bid for jobs and those workers who got a job have to decide on a firm-specific investment that benefits the worker by reducing his production cost. Parameters are such that investment is unprofitable if the worker is only employed for one period. The game-theoretic solution of the model proposes that investment is independent of contract length. Thus, the model is an example for the efficiency of spot markets. Theoretically long-term contracts do not increase firm-specific investment. In contrast to the game-theoretic solution the main hypothesis of Anderhub, Königstein and Kübler (1999) proposes a positive influence of contract length on investment decisions. The evidence supports their hypothesis: investment rates of experienced subjects are 69 percent for short-term contracts and 97 percent for long-term contracts (game theory predicts 100 percent in both cases). The authors conclude that job security may increase investment into firm-specific human capital even in environments where theoretically spot markets generate full efficiency. Thus, these results suggest that dismissal rules that grant job security may improve welfare (for econometric field evidence see, e.g., Bertola 1990).

4.2 The social embeddedness of the labour relation

A natural feature of many employment relationships is that they are also characterised by *social* interactions. In most instances work does not take place in a social vacuum, i.e., under completely anonymous conditions. Instead, employers and employees personally interact with each other. Something similar holds true in teamwork.

In general, a substantial amount of economic production takes place in personalised settings. Sociologists, like Granovetter (1992), have therefore stressed the 'embeddedness' of

economic transactions in social structures in which social incentives are important as well. Blau (1964) points out that many incompletely regulated social relationships are characterised by a social exchange. In the work context, in particular, behaviour may be based on a social exchange of good performance against social approval. Consistent with this argument, human resource economists often stress the importance of social influences on work motivation. In team work 'peer pressure' can help to sustain work morale. Kandel and Lazear (1992), Rotemberg (1994), and Barron and Paulson Gjerde (1997) provide formal models in which voluntary cooperation can be observed in exchange for social approval.

How do social exchange incentives work in the gift exchange game? Are they capable of mitigating the cooperation problem? To ascertain the impact of social approval incentives and to separate them from repeated game effects, Falk, Gächter and Kovács (1999) have designed four treatment conditions. In all treatments the gift exchange game described in Section 2 was used. The first treatment was the pure *anonymous one-shot treatment* that we have already described above. All other treatments were finitely repeated games, i.e., the same firm-worker pair played the gift exchange game for ten periods. The second treatment just consisted of a ten-times repeated gift exchange game under *anonymity*. The third and the fourth treatment condition lifted anonymity. In the *third condition*, a particular firm-worker pair was seated *face to face*. Communication was not allowed neither during the experiment, nor afterwards. Thus, the exchange of social approval or disapproval was only possible through facial expressions. In the fourth condition, the *social pressure* treatment, subjects were also seated face to face. Subjects were told that they are not allowed to communicate during the experiment, but that they have to talk about their decisions at the end of the experiment. This discussion provided the possibility for verbal social exchange. These treatment conditions are a minimal setup to study the effects of social approval or disapproval without having communication as a coordination device available (see Bohnet and Frey 1999 and Falk, Gächter and Kovács 1999for further discussion).

Figure 4 above contains the main results. In our discussion about the benefits of a long-term interaction, we have already observed that a repeated interaction considerably mitigates the cooperation problem. Surprisingly, adding social approval incentives did not change the outcome very much. Average effort levels increased only slightly. Since the design is 'additive' in the sense that – everything else equal – only one factor is added in a new treatment, this shows that, economically, the decisive step in mitigating the cooperation problem seems to be the repeated interaction. At least in these experiments, the social exchange incentives were of minor importance.

5. Work motivation and incentive schemes

In the previous sections we have seen a host of findings that underscore the importance of reciprocity-based voluntary cooperation. These results from the lab nicely complement the arguments by organizational scientists on the importance of "loyalty" (Simon 1997), "consummate cooperation" as opposed to "perfunctory cooperation" (Williamson 1985), "morale" and "good will" (Bewley 1999), "intrinsic motivation" (Frey 1997) and "organisational citizenship behaviour" (Organ 1988).

The importance of voluntary cooperation in modern labour relationships raises the question how *explicit performance incentives* affect voluntary cooperation. Economic theory

has made a lot of progress in characterising optimal incentives schemes and contracts.[14] However, standard theory has neglected the importance of social motivations and the determinants of voluntary cooperation. In addition to the question how explicit incentives influence behaviour, the question of interaction effects between performance incentives and reciprocity-based voluntary cooperation comes up. Understanding the interplay of voluntary cooperation and explicit performance incentives is an important practical matter, because both performance incentives and voluntary cooperation are important in labour relations. In the following we concentrate on experiments that shed light on this interplay of voluntary cooperation and explicit incentives.[15]

We start with Fehr and Gächter (2001) who have extended the gift-exchange design by incorporating a very simple incentive device.[16] Firms could offer a contract (w, f, $\hat{e}$) that stipulated a wage w, a desired effort $\hat{e}$ and a fine f the worker had to pay if it could be verified that she has shirked, i.e., $e < \hat{e}$. With probability $0 < s < 1$ shirking was detected. Under the assumption of risk neutrality, a worker will not shirk (i.e., $e = \hat{e}$) if $w - c(\hat{e}) \geq s(w - f) + (1 - s)w \Leftrightarrow sf \geq c(\hat{e})$ holds.[17]

Parameters f and s were such that the maximally incentive-compatible effort was above the minimum but below the maximal feasible effort. In this framework, where voluntary cooperation is defined as an effort above the best-reply effort, Fehr and Gächter (2001) test two hypotheses: (i) reciprocity-based voluntary cooperation and financial incentives add up and (ii) financial incentives crowd out voluntary cooperation. The first hypothesis is supported if workers' effort choice only depends on the generosity of the firms' wage offer; the second hypothesis holds true if people perceive the fine as a threat and mistrust that is incompatible with voluntary cooperation. To judge possible crowding effects, Fehr and Gächter (2001) have also replicated the gift-exchange game without the fines (i.e., where firms could only offer (w, $\hat{e}$)).

The data support the second hypothesis: while in the treatment without fines the previous results from the numerous gift-exchange experiments are replicated, voluntary cooperation breaks down in the incentive treatment. Instead, agents choose best-reply effort levels in many cases. Thus, it appears that the material incentives have led to a crowding out of voluntary cooperation.

Yet, is this result due to the material incentives *per se*, or is it just the framing of the incentive that is inimical to voluntary cooperation? To test this argument, Fehr and Gächter (2001) ran a treatment, where the incentive was framed as a bonus that was forfeited in case of detected shirking. Parameters were such that the incentive structure was exactly *identical* to the fine treatment (in the experiment no value-laden terms like fine or bonus were used).

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[14] See Gibbons (1998) and Prendergast (1999) for recent comprehensive surveys. Milgrom and Roberts (1992; in particular Chaps. 7-13) and Lazear (1995, 1998) provide textbook accounts.

[15] Investigating properties of incentive systems in the lab is a fertile area of research. DeJong, Forsythe, Lundholm and Uecker (1985), Berg, Daley, Dickhaut and O'Brien (1992), Epstein (1992), and Keser and Willinger (2000) investigated standard principal-agent games. Chaudhuri (1998) and Cooper, Kagel, Lo and Wei (1999) studied the 'ratchet effect'; Bull, Schotter and Weigelt (1987) tested tournaments and piece rates; Irlenbusch and Sliwka (2001) and Oosterbeek, Sloof and Sonnemans (2001) investigated 'career incentives'. Dickinson (2001) examined the relative merits of rewards and punishments in various incentive schemes. van Dijk, Sonnemans and van Winden (2001) studied incentives in real effort experiments.

[16] For related studies see Benz, Fehr and Frey (2001) and Fehr, Klein and Schmidt (2001) who investigate multitask relationships and Fehr and Rockenbach (2001) who study sanctions in the investment game.

[17] The left-hand side of the inequality is the worker's payoff from non-shirking and the right-hand side is the expected payoff of shirking if we assume that $e = e_0$ in case of shirking and $c(e_0) = 0$. Since, for simplicity, f does not depend on the amount of shirking, a worker who decides to shirk will always shirk fully, i.e., $e = e_0$.

Thus, if crowding out of voluntary cooperation is due to the material incentives per se we should get a similar result as with fines, since the bonus is just a differently framed incentive device. If fine and bonus are perceived differently, despite being the same materially, then we might not observe a crowding out of voluntary cooperation. The data support the latter reasoning. With a bonus as an incentive device, voluntary cooperation was largely left intact.

An interesting observation from these experiments concerns *efficiency* as measured by the surplus (the sum of profits of worker and firm). Here it turned out that efficiency was highest in the experiments without explicit incentives, and lowest with fines as incentive devices. However, the firms' profits were highest with fines and lowest without any incentives.

Profit sharing is another possibility to align interests between an employer and an employee. An employee who receives a profit share has an incentive to provide an above-minimum effort level because his effort choice has an impact on the profit. This mitigates the efficiency problem associated with contract enforcement. Put differently, it is exactly this incentive that is lacking in incomplete contracts in which firms can only pay a fixed wage.

Building on previous experiments by Güth, Klose, Königstein, and Schwalbach (1998) and Fehr and Gächter (1998), Anderhub, Gächter, and Königstein (2001) have investigated this idea in a principal-agent framework.[18] Their design is as follows. A firm can offer the worker a work contract that consists of three elements: a fixed wage w, a return share s ($s \in [0,1]$), and a desired effort level $\hat{e}$, which is non-binding (as above). An agent, after having accepted a contract, then has to choose an effort level. This effort produces a return of $r(e)$. The payoffs to the worker and the firm, respectively, are as follows:

$$\pi^W = sr(e) + w - c(e) \qquad \text{and} \qquad \pi^F = (1-s)r(e) - w.$$

The fixed wage w can be positive or negative. For example, $w > 0$ and $s = 0$ is a contract in which the firm just offers a fixed wage to the worker and keeps the whole return (this is the situation we have analysed so far). At the other extreme, if $s = 1$ and $w < 0$, this is tantamount to 'selling the return to the worker' at a price of $w < 0$. Hence, this design allows for a great variety of contracts. In the subgame perfect equilibrium, however, the contract [$s = 1$, $w^* < 0$ such that $-w^* = c(e^{max}) - r(e^{max})$] is the solution: If all parties are rational and selfish, they will realise that it is the worker with his effort decision, who solely produces the return. The return is highest if the effort is highest (i.e., $e = e^{max}$). This is also the efficient outcome. If the worker gets the full return (i.e., with a profit share of $s = 1$) she has no reason to provide less than full effort. The maximal price that the firm can ask for is the difference between this maximal return and the effort costs. A selfish worker, in turn, will be willing to pay any price $w < 0$ that leaves him with a non-negative payoff (i.e., $r(e) - c(e) \geq 0$). In other words, in equilibrium, the firm will appropriate the whole surplus.

Two main results of the experiment are in line with these predictions. First, it is indeed the case that in the overwhelming number of concluded contracts the firms offer return shares of $s = 1$. Second, the workers' effort behaviour is in most cases 'incentive compatible' in the sense that the workers provide *at least* the effort level that is individually rational given the incentives set by the particular profit share. Hence, in these experiments a high degree of efficiency is reached.

[18] See Güth, Königstein, Kovács and Zala-Mezõ (2001) and Königstein, Kovács and Zala-Mezõ (1999) for extensions to a design with multiple agents, and Nalbantian and Schotter (1997) for an experiment on profit sharing at the group level.

The prediction that firms will ask for the maximal price, i.e., the whole surplus, is not borne out by the data. Most contract offers were such that they shared the resulting surplus about equally by proposing an appropriate $w < 0$. Workers indeed rejected contracts if the price they had to pay was 'unfairly high' and would have left them with almost zero profit. This finding is very much in line with related experimental results on the 'ultimatum game' and the evidence on rent sharing discussed above. Keser and Willinger (2000), in their 'principal-agent' experiment, also found that the agents behaved in concordance with the incentives set by the principals and that they rejected 'unfair contracts'.

Do these results imply that there is no reciprocity anymore in this contracting game? The data do not allow us to draw such a conclusion. A further analysis shows that workers deviated in a reciprocal way from their best-reply effort level. In line with the previous findings discussed above, the more generous the contract offer of the firm, the higher has been the effort choice of the worker (Güth, Klose, Königstein and Schwalbach 1998 get a similar result in their principal-agent experiment). This result allows connecting to the above findings. It appears that this kind of profit sharing is a performance incentive that leaves the reciprocal motivation intact.[19]

A further study is by Schotter (1998) who investigated the role of trust in the achievement of equilibria in an incentive system. The experiment was one where the incentive system was team profit sharing, which induces two equilibria (a 'high' and a 'low' effort equilibrium) that differ in their *vulnerability.* Roughly, vulnerability can be defined as the extent of 'riskiness' of an equilibrium in terms of how much an agent who provides a high level of effort is hurt by a lower effort put forward by his companion workers. The basic idea of the experiment is that workers' trust in high effort choices of others may help them to co-ordinate on a 'high effort', but 'vulnerable' equilibrium. The more 'trust' workers have, the more likely are 'high but vulnerable' effort choices.[20] In various treatments Schotter (1998) showed that this argument is indeed borne out by the data. Schotter concluded that "worker trust and system vulnerability" are complementary. This has important implications for the design of work places and performance systems. In concordance with the previous results reported above, it is not only the incentive properties of the incentive mechanisms that matter but also the social norms and the norms of trust workers hold and develop with their fellow workers.

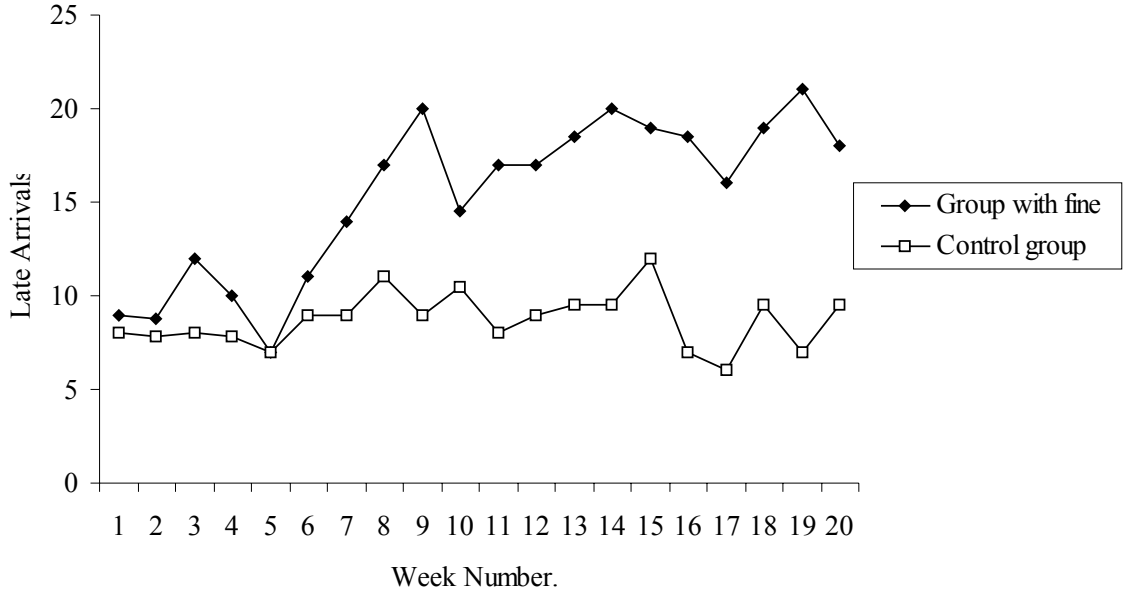
Gneezy and Rustichini (2000a) conducted a very nice field experiment to test the interplay between explicit incentives and voluntary cooperation. Their subject pool were ten Israeli day-care centres for young children, where the parents are supposed to pick up their

[19] In a further exploration of the data collected by Anderhub, Gächter and Königstein (2001), Königstein (1999) investigates optimal contract design based on actual as opposed to theoretical behaviour of agents. He estimates the empirical acceptance function and the empirical effort function and thereafter determines the payoff consequences of alternative contracts. He finds that the principal's income is maximised by a mixed contract with an intermediate level of profit share and fixed wage, rather than by a contract with a very high profit share but low fixed wage. Specifically, keeping the agent's income constant, it is optimal to choose an intermediate policy-mix rather than an extreme one. Although this result may depend on the specifics of the experiment of Anderhub, Gächter and Königstein (2001), by identifying the behaviourally relevant acceptance and incentive functions, this result points to a general avenue for behavioural research in principal-agent games.

[20] In these experiments 'trust' should arise endogenously. Before playing the profit sharing game, all subjects had to play a coordination game with many Pareto-rankable equilibria. Some subjects first had to play the 'minimum effort game' where experimental play reliably leads to the Pareto-inferior equilibrium (see Ochs 1995 for an overview). In contrast, other subjects first played a 'median effort game' where usually Pareto-better equilibria are reached. Schotter conjectures that the former leads to a 'low trust' climate in the subsequent profit sharing game, whereas the latter induces high trust. Schotter replicates the results from various co-ordination game experiments and shows that either type of co-ordination game is a good predictor of behaviour in the hypothesised direction in the profit sharing game.

kids at 4 p.m. Many parents arrive late, which forces the teachers to stay. Simple economic theory suggests that the introduction of a fine will do away with the problem. To test this prediction, Gneezy and Rustichini (2000a) ran a field experiment in cooperation with the managers of the day-care centres (but without the knowledge of the parents). They recorded the late-arrivals in all ten day-care centres for four weeks. After four weeks, six day-care centres announced a small fine for arriving late. In the other four day-care centres, which served as the control group, the patterns of late arrivals were just observed and no fine was introduced. After twelve weeks the fine was abolished in all six day-care centres. Late arrivals were just recorded (in all ten day-care centres). Figure 5 documents the results of this field experiment.

Figure 5: Average number of late-coming parents, per week



Source: Gneezy and Rustichini (2000a)

The results show that the pattern of late-arriving parents is stable over time in the control group. In the first four weeks the pattern of late arrivals is the same in both the control group and the treatment group. However, after the day-care centres of the treatment group introduced the fines, the number of late-arrivals *increased,* instead to decrease as is predicted by economic theory. After the fine was abolished, late-arrivals remained at the increased levels. Gneezy and Rustichini (2000a) argue that fines, as well as rewards, may change the perception of the psychological contract: While the day-care centres operated on a basis of good will before the fines were introduced, parents may have perceived the fine as a price: "Once a commodity, always a commodity" (p. 16).

In another related study Gneezy and Rustichini (2000b) come to a similar conclusion. In this paper, they investigated performance incentives in two different tasks (using different subject pools). The tasks were (i) answering 50 questions taken from an IQ-test (called the "IQ Experiment") and (ii) collecting monetary donations for societies of cancer research (called the "Donation Experiments"). In the IQ experiment they studied different levels of payments: no payment, 10 cents, 1 New Israeli Shekel (NIS), and 3 NIS; in the donation experiment subjects received either no payment or 1 or 10 percent, respectively, of the

collected amount. In both experiments, economic theory predicts a monotonic relationship between the level of incentives and the respective performance. The results are striking. In the IQ experiment, subjects in the no payment condition answered on average 28.4 questions correctly. In the low incentive condition, performance dropped to 23.07 correct questions. With NIS1 and NIS3 the number of correct answers increased to 34.7 and 34.1, respectively. A similar result is found in the donation experiment: With no payment, subjects collected on average 238.6 NIS. With a payment of 1 percent, the collected donations dropped to 153.6 NIS and amounted to 219.3 NIS if subjects received 10 percent of the donated money. Gneezy and Rustichini (2000b, p. 807, emphasis theirs) summarize their findings as follows: "The result has been that the usual prediction of higher performance with higher compensation, *when one is offered,* has been confirmed: but the performance may be lower *because of* the introduction of the compensation." The reason might be that very low payments are perceived as "insulting".

It is worthwhile to set the findings from this section into perspective to the results on the repeated gift-exchange experiments discussed above. There we have seen that the mere fact of having a 'long-term' relation considerably increases voluntary cooperation, without any explicit performance incentives that may have dysfunctional effects. One reason might be that the incentives that are provided by a repeated interaction are perceived as "reciprocity-compatible" in the sense that they leave the reciprocal motivations intact. Moreover, a repeated interaction may foster social ties that attenuate shirking incentives (van Dijk, Sonnemans, van Winden 2000). In addition, those not motivated by reciprocity have an incentive to imitate reciprocity. Thus, simply having a long-term employment relation may mitigate the shirking problem. In our opinion, these laboratory findings support arguments in the business literature that praise the benefits of long-term employment relationships (e.g. Pfeffer 1999; Miller, 1992, Chaps. 9 and 10).[21]

A summary of the basic message of all experiments in this subsection suggests that in incomplete contracts not only the material incentives are important but also the *perception* of the terms of the contract is crucial (see also Frey 1997). This makes things less straightforward than economic theory suggests. Understanding the incentives, *as people perceive them*, surely is an important task for future research.

What are the implications for the design of optimal contracts (see also Königstein 2001)? The results reviewed above show that material incentives can have counterproductive effects.[22] While this suggests that one should take crowding out effects seriously, it does not mean that material incentives will in general impair efficiency. The presence of fairness-related voluntary cooperation indicates that incentives should be designed such that they do not inhibit voluntary cooperation. More generally, optimal contracts should take the perception of the "psychological contract" into account and not only focus on the material incentive effects.

[21] See Gächter and Falk (2002) and Fehr and Falk (2001) for further discussion.

[22] A similar logic may hold for contract enforcement through the law. See Frey (1997, Chap. 6) and Bohnet, Frey and Huck (2001) for a theoretical model and experimental evidence.

6. Concluding remarks

In this paper we have surveyed recent laboratory experimental research that is inspired by issues that are important in labour and personnel economics. In doing this, we have concentrated on four topics: (i) the behavioural consequences of incomplete employment contracts and the importance of gift-exchange motivations; (ii) how the behavioural regularities can explain important labour market phenomena; (iii) characteristics of employment relations, and (iv) the interplay of various incentive schemes with trust and voluntary cooperation.

The starting point of our review has been the contractual incompleteness of most actual labour relations. Incompleteness leaves room for behavioural discretion. With selfishly motivated labour market participants many of these relationships are bound to reap only inefficiently low gains from trade whereas a more 'co-operative behaviour' would lead to higher gains from trade. We have in particular investigated the role of *reciprocity* as a contract enforcement device and as a means to overcome inefficiencies inherent in contractual incompleteness. However, in principle, all experiments on social motivations and on the conditions of successful co-operation are of relevance here. By now, there is an abundance of evidence that most people are not only motivated by their selfish material gain. Much of this evidence has been gained from carefully conducted, simple stylised games, like the ultimatum- and the dictator game, the prisoner's dilemma and voluntary contribution games, trust- and investment games, and so on (see Kagel and Roth 1995 and Camerer 2001 for the most comprehensive overview to date). Many experiments reviewed in this paper – in particular those on incentive schemes – can also be seen as a 'test' to what extent social motivations identified in simple and stylised games, transfer to the more complex economic incentive structures that may be relevant in labour market contexts.

Open issues in labour economics have inspired most of the experiments reviewed in this survey. One of the fascinating aspects of research in this area is that the empirical methods can be used in a *complementary* way to provide better behavioural foundations of labour economics (Agell 1999; Kaufman 1999). Economic theory and empirical methods like case studies, interviews with labour market participants, conventional econometric analysis of field data, and laboratory research, can help identifying – in an interdisciplinary way – the principles that govern employment relations and the labour market.

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